GEOGRAPHIC NEWS BULLETINS

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NOTE TO TEACHERS: With next week's issue, which concludes Vol. VI, will be published the index to subjects and illustrations printed during the past year. Teachers who wish to have their subscriptions to the Geographic News Bulletins complete with the new volume should forward their requests immediately.

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TONGING OYSTERS IN CHESAPEAKE BAY (see Bulletin No. 4)

HOW TEACHERS MAY OBTAIN THE BULLETINS

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The Man Who Changed the Geography of Rubber

THE SCENE is an exposition of rubber and rubber products held recently in London.

Officials assemble to welcome a man, proud and erect despite his 81 years. He has come to see the thousand-and-one articles which owe their existence to rubber. He is amazed at the marvels which his deed fifty years ago made possible.

Sir Henry Wickham, as much as any individual now living, changed the industrial geography of our modern world. Twenty years ago the world depended upon savages in the Amazon jungles beyond Para for an unreliable supply of rubber. In 1876 Sir Henry transported a cargo of rubber tree seeds from Para, Brazil, to Kew Gardens, London, where the seeds sprouted. The young trees became the ancestors of the vast rubber plantations of Malaya, Java and Ceylon which annually supply the United States alone with nearly a billion pounds of rubber valued at a half billion dollars.

When Sir Henry, who was knighted for his exploit, visited the Rubber Exposition in London, he drew from his pocket a few hard, yellow seeds, part of the consignment he brought out of Brazil.

Coincident with the London exposition, the State of Para, Brazil, has hailed the promise of a revival of its rubber reputation. American investors have purchased tracts with a view to cutting down the jungle and planting rubber trees.

Para is the natural home of Para rubber. For more than a century rubber has been its chief commodity. Its forests abound in rubber trees that freely supply latex, the milk-white juice of the inner bark. Evaporation drives off water from the juice, leaving rubber.

In the East Indies the plantation cultivation of the Para rubber tree increased production rapidly. Para lost its supremacy in the rubber world because the rubber collectors continued to use crude methods of collecting latex from wild trees of the forests.

In fact, the whole State of Para, like its rubber industry, awaits development. The Portuguese reached Para five years before the Pilgrims landed in New England. Much of its area, which is more than three times that of Ohio, Pennsylvania and New York combined, is still a jungle wilderness.

Roads are almost unknown in the State. Even in Para City, the capital and only large city in the State, many streets abruptly stop at the jungle's edge. True, one can travel through the jungles for miles by the paths of rubber collectors that lead from tree to tree, but it would be impossible to use four-wheeled vehicles. The natives have met this problem by the use of Para's numerous rivers as highways. The Amazon, which flows through the State for five hundred miles, is the Grand Boulevard, and its numerous branches form a system of side streets that stretches out like a huge net to all parts of the State.

Most travelers see Para from the Amazon steamboats. While the Amazon is the main transportation artery in northern Brazil, its banks are almost devoid of human life. The traveler's first stop is Para, the capital, which lies about 75 miles up from the sea. Approaching the docks, the capital looms up as a concentration point for rubber and other products from the interior. Chunks of rubber, shaped like huge hams, fill warehouses lining the water front. The air is permeated with the odor of smoky rubber.

A FOREST OF PLANTATION RUBBER IN THE STRAITS SETTLEMENTS © Burton Holmes from Galloway

Contrast with the view of the Amazon jungle, the former chief source of rubber, following Bulletin No. 1. The 22 rubber trees which fruited in Singapore in 1881 started the Malay Peninsula on the road to being the world's largest producer of rubber. It has three-fifths of the world's total acreage of plantation rubber and supplies the greater part of that which comes to the United States to meet the ever-increasing demands of the automobile industry.

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Osaka: Terminus of Japan's First Airplane Passenger Service

OSAKA is at one end of Japan's first airplane passenger service. Tokyo is at the other end.

Planes travel the 266 miles separating Osaka, the industrial capital, from Tokyo, the official capital of Japan, in two and one-half hours.

Osaka, which can be styled the Pittsburgh of Nippon, lies at the head of Osaka Bay on the great south coastal plain, which also includes Kobe and Kyoto. It is one of the teeming manufacturing districts of the world, comparing in concentration of industry to Belgium or the English midlands.

Osaka's chief temple is sacred to the turtle, indicative perhaps of the low-lying situation of the city. Several small streams and numerous wide canals intersecting each other at right angles give the appearance of a Dutch landscape. Some of the inhabitants designate their water-logged metropolis the "Venice of Japan," but moist climate and low, gray-tiled houses smack more strongly of Holland than of Italy. Above countless chimneys belch volumes of black smoke into the atmosphere, and streams are fouled with the waste from thousands of factories. Only in the darkness of a summer evening from the deck of one of the myriad lantern-lighted "coolness boats" do Osaka's industrial waters hint of the Grand Canal.

Center for Iron Works and Big League Wrestling

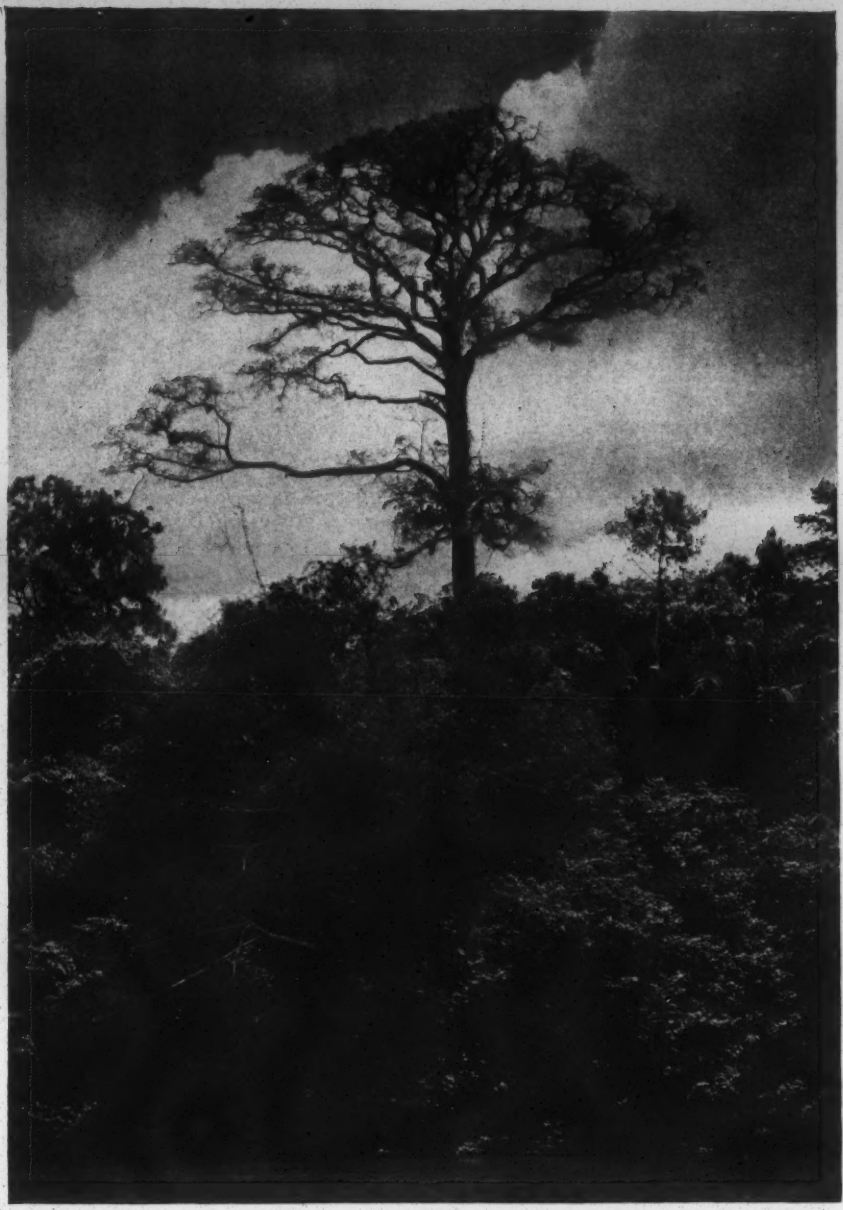
Iron works, shipyards, cotton mills, and sugar refineries give employment to thousands of men and women. Much of the crockery ware, lacquer ware, cloth and articles of silk, ivory, bone, and bamboo, with which Japanese merchants compete in the world's markets, originates in Osaka. Osaka's Board of Trade has a powerful influence. The rice exchange is said to rival Chicago's famous wheat pit in frantic bidding.

In Osaka are the head offices of one of Japan's largest shipping firms which has lines running to the coasts of China and Chosen (Korea) and ships visiting every Oriental harbor from Vladivostok to Singapore as well as San Francisco and Seattle. Though the Osakians are building mammoth harbor works of their own, much of their trade still goes through the neighboring seaport of Kobe, on the same bay. Kobe is a smaller city, but it had the advantage of an earlier and larger foreign settlement and a roadstead less obstructed by sand-bars. Kobe and Osaka lie at one end of the far-famed scenic fairyland known as the Inland Sea.

While the world at large knows Osaka as a manufacturing and shipping city of first magnitude, in Japanese eyes it has another significance of scarcely less importance. Together with Tokyo it is the seat of Japanese big league wrestling, where the champions of the eastern and western parts of the empire meet for a fight to the finish before crowds which would do credit to Madison Square Garden in New York.

Incense of Factory Smoke Envelops Shrine of Ancient Rule

Japanese wrestlers are giants, more than six feet tall and they weigh from two to three hundred pounds. They fight naked save for a tight wrestler's belt, and go for a quick throw, rather than play for time. They wear their hair in a top-knot, and, squatting opposite each other at the beginning of a match, give the



© Photograph by Capt. A. W. Stevens, U. S. A. Air Service

TO THE AMAZON JUNGLE THE WORLD LOOKED FOR ITS RUBBER SUPPLY 20 YEARS AGO

Contrast the tangled mass of vegetation shown in this picture taken on a tributary of the Amazon River with the illustration of a rubber tree orchard in the East Indies facing Bulletin No. 1. It is inconceivable that the United States could have obtained from the untamed jungle the billion pounds of rubber now required each year. American interests plan to cut down the forests in a part of the State of Para and plant rubber trees in orchards.

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Why There Are Tides on Both Sides of the Earth at the Same Time

WHY IS the tide?

The strength of the tidal force was interpreted in the bulletin printed last week, "The Pull of the Moon, a Force That Helped Flood London."

It is relatively easy to understand why the moon should tend to *pull* a tide into existence on the side of the earth directly under it. But why at the same time should it appear to *push* up a tide on the far side of the earth?

Prove It by Whirling a Child in a Circle

The usual explanation of the formation of the bulge on the far side is that just as the moon draws the water nearest it away from the solid part of the earth, so it draws the solid part of the earth away from the water farthest from the moon. The average person is likely to rebel at this explanation, since he does not carry in his mind the knowledge of astronomical forces.

The explanation begins with the fact that the moon does not simply revolve in a path around the earth. It also throws the earth to revolving in a little path of its own.

When you playfully grasp a small child by the hands and swing it around in a circle you cannot stand erect and pivot on a single heel. Instead you must lean backward and take tiny steps in a very small circle in order to maintain your balance.

The situation with regard to the earth and moon is similar. The force which connects these two whirling globes is just as real as though it depended on a huge steel shaft, several hundred miles in diameter, connecting them. When the earth swings the moon around it, the earth must back off, so to speak, in a little circle (or ellipse) of its own.

Earth and Moon Like a Freakish Dumbbell

What happens is that both bodies revolve around their common center of gravity. Since the earth has a mass so much greater than that of the moon, this common center of gravity is not in space between the two globes, but lies inside the earth, on a line connecting the earth and moon centers. It is as though you had a freakish dumbbell made up of a heavy ten-pin ball fixed to one end of the connecting shaft, and a small boy's marble fixed to the other. The balancing point would lie inside the big ball. You could find it (or the surface point above it), drive in a tack, and hang the balanced balls up by a string. Now, if you twisted the string the little ball would revolve about the line of the string in a large circle, and at the same time the outer side of the big ball would revolve around the same line in a small circle.

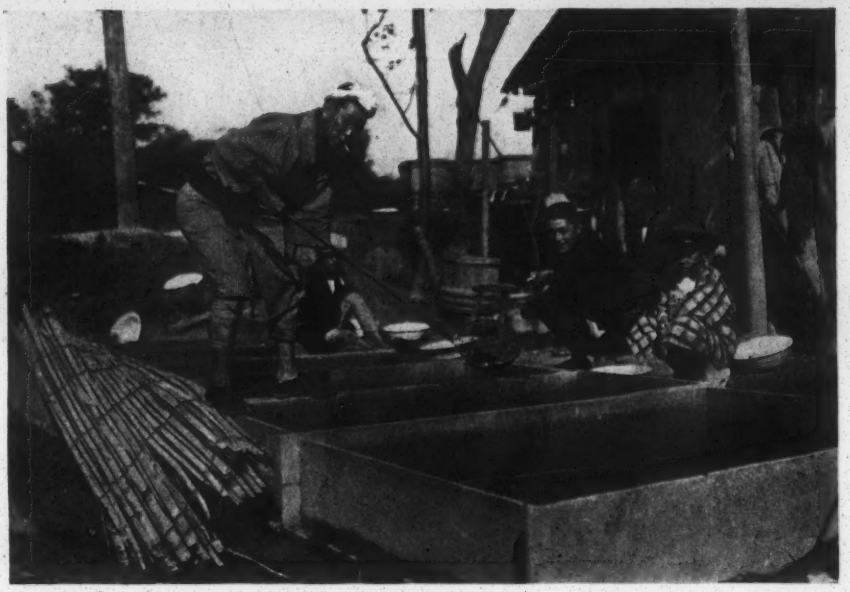
In the case of the earth and moon, the "balancing point," or common center of gravity, is about 1,000 miles below the surface of the earth and about 3,000 miles short of the earth's center.

Now imagine, for a moment, that the earth were somehow fixed in space, neither rotating nor revolving, with no moon in the heavens, and with no other forces acting on it but its own gravity. Its water surfaces would tend to form parts of a perfect sphere with no bulges. Now imagine the moon to be placed 239,000 miles away (its present average distance) and also in some way to be

appearance of a couple of giant bullfrogs. Many pairs of contestants will meet in one afternoon's entertainment. National interest in the great matches compares with enthusiasm in America for big league baseball. The sport has been fostered by the highest patronage in the land for generations, and a well-known wrestler becomes a popular hero.

Osaka castle is a romantic link with older days before the call of industrialism drew thither almost overnight countless thousands of busy toilers. The castle dates from feudal times, and its walls are impressive in their gigantic masonry, still retaining the artistic lines of old Japan. Interior buildings were destroyed by a revolutionary fire. The great shell of the ancient stronghold dominates from its heights the flat monotony of the present industrial city, smoke from whose chimneys rises like a kind of incense around this feudal reminder of Japan's earlier days.

Bulletin No. 2, February 13, 1928.



© Photograph by Kigoshi Sakamoto

AN OSAKA GOLDFISH VENDER'S WOODEN BOXES OF "GOODS"

He is sorting the fishes according to size and value, just before going to the streets to announce his fish with a cry, "O, Kingyo-e!" It is estimated that the yearly production and sale of goldfish in Japan exceeds 20,000,000, with an aggregate value of $500,000. The fish vary in price, according to the rarity of the specimens, from half a cent to $150 each.

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The Chesapeake Bay Country

TWO RECENT incidents of public interest have directed attention to Chesapeake Bay.

Maryland and Virginia, although both colonial States, have only recently determined their official boundary where the miles-wide mouth of the Potomac merges into Chesapeake Bay.

Governor Byrd ordered a patrol of the deep bays on the Virginia shore because oyster tongers threatened to violate the laws.

These two events occurred in the region President Coolidge sees on trips down the Potomac on the *Mayflower*. The region is also the scene of the early settlements of Virginia and Maryland.

Sixty-Three Hours from Washington to Baltimore

School histories tell how tobacco planters of colonial Virginia depended on rivers for transportation; and, in 1928, the lower Potomac and Chesapeake Bay country still is in the river transportation age.

Traveling by water is the most convenient way to visit it. Representative of the trips which can be made on small Chesapeake Bay steamers, is the journey from Washington to Baltimore. The steamer travels 360 miles by water in sixty-three hours. Washington and Baltimore are forty-five minutes apart by rail.

On its leisurely way down the Potomac, the steamer touches history nearly every time it puts in at a landing in Maryland or Virginia. Passengers hear the whistle blast the traditional salute to stately Mount Vernon. Across the river is Marshall Hall, and in Gunston Cove is Gunston Hall, manor of Washington's close friend, George Mason. Port Tobacco cannot be reached. Its creek has silted up. But Colonial Beach, once the private landing of "Light Horse Harry" Lee, awaits the steamer. Colonial Beach is now a summer resort for Capital residents. Wakefield, birthplace of George Washington, is within sight from the steamer lane.

Northern Neck Has Never Heard a Railroad Engine Whistle

The land on the Virginia side, Northern Neck, is the birthplace of presidents and statesmen. From Northern Neck came George Washington, James Monroe, Robert E. Lee, Thomas Lightfoot Lee, and Richard Henry Lee, and the father of John Marshall. Near the edge of it was born James Madison. Northern Neck to-day is much the same Northern Neck that those famous Americans knew, each in his day. The railroad whistle has never blasted the peaceful quiet of the countryside. Before invading its highways motorists inquire closely into the weather predictions. Its contact with the outside world is limited almost entirely by the little river freight and passenger boats.

Northern Neck is the northern strip of a great rectangular block of land between the parallel lines of the Potomac and James Rivers. If you search the map closely you will see that this block is sliced into three major sections by tidal rivers. Wide river mouths on a 70-mile front separate and isolate headlands almost as effectively as would mountain ranges. On the opposite Maryland shore there are five headlands in 60 miles. So along the Chesapeake one goes visiting in a motor boat.

One historic Potomac landing is St. Mary's. The steamer winds up between

fixed in space—no motion to either earth or moon. Further, assume that moon and earth attract each other as they now do. The waters of the earth would bulge upon the side nearest the moon because the moon would pull them to a certain extent away from the rocky part of the (fixed) earth. But there would be no bulge on the far side of the earth.

Imagine, also, the earth and moon to start revolving around their common center of gravity once every 27 1/3 days, as at present, but not rotating on their axes. Two fixed bulges would now exist, the one toward the moon would grow less than when the earth was motionless, but would still be held up by the moon's pull.

But why would the bulge arise on the far side of the earth from the moon?

Tidal Forces in Terms of an Automobile Turning a Corner

The earth and moon, revolving around their common center of gravity in approximately one month, are striving to fly apart and to strike out in space on straight paths that would carry them away from each other. They cannot really fly apart because gravitation holds them together, but, none the less, they are constantly *trying* to fly off.

Consider now only the earth's tendency. Continually the earth seeks to fly off in a straight line away from the moon, and continually the moon drags it back into the little orbit that has been described. But the water on the side of the earth away from the moon is 4,000 miles farther from the moon than is the center of the earth; and it is free to flow as the solid earth is not. Therefore this remote water is pulled toward the moon with a weaker force than the solid earth, and so takes a slightly greater orbit than the solid earth and bulges away from the moon.

Perhaps this tide-producing force on the side of the earth farthest from the moon can best be understood in terms of an automobile's motion. If an automobile is traveling rapidly in a straight line along a street and suddenly turns a corner, occupants of the back seat will be thrown forcibly to the outer side of the car, away from the center of curvature. Packages will slide across the floor and pile up on the outer side of the car.

Both the automobile and its contents have the tendency to go on in a straight line. When the steering wheel is turned, the car—if it does not skid—responds to a force changing its direction; but the packages and passengers, being free to move about, respond to the changed direction less quickly and "pile up" on the outer side. If the car is driven rapidly in a small circle, the movable objects and passengers are given a continual urge toward the outer side.

Rotation of Earth Introduces Still Another Factor

Now, the earth is being driven constantly in a small circle, so to speak, by the moon; that is, its direction is continually changing from a straight line to a circle. The waters of the oceans are the most freely moving objects on this circularly traveling earth. Consequently, those nearer the outer side of the curved path tend to pile up to form the tide on the side of the earth away from the moon.

Now, remembering that our imaginary earth and moon are revolving in space, but not rotating, let us make one more change to bring the situation into accord with the actual facts. Start the earth to rotating on its axis once in twenty-four hours. The tide-producing forces, toward and away from the moon, would continue to operate as before, tending to pull the water into bulges. But those bulges would no longer remain at the same two places on the earth's surface. The earth would turn under the forces. Thus any point on the earth well away from the poles would be subjected to a tide-producing force approximately every half day. The period is slightly greater than half a day, because of the moon's revolution around the earth.

How the tides actually operate, however, and how their theoretical action is altered by the sun, by the shapes and extents of ocean basins, and by changes in the distance between earth and moon, make another story.

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Australia Plots to Recover 60 Million Acres Captured by the American Prickly Pear

THE MEXICAN beetle, the Japanese beetle, the European corn borer, the English sparrow—these are names of other nations and regions we have used to describe imported pests.

But America is likewise a source of pests to other parts of the world. Australia has, perhaps, the greatest grievance against us; a 60-million-acre grievance. The prickly pear of the Southwest has infested parts of Australia. The acreage in Queensland which has been ruined for agricultural purposes by the prickly pear is equal, almost, to the area of the State of Oregon.

Australia has hailed the discovery of a plant disease in the Bermuda Islands which attacks the prickly pear. Experiments are in progress to determine whether the disease can be safely introduced into Australia to exterminate the plant usurper of Australian plains.

The Hedgehog of the Vegetable World

The prickly pear, which Australians are so eager to combat, is well known to those who have visited the plains in the West and Southwest of the United States. It is rather an awe-inspiring plant to the city dweller acquainted only with such unpleasantly armored vegetation as rose bushes. The prickly pear is made up of flat, green segments shaped like stiff, fat, elongated pancakes, set on edge and growing out of one another. The layman would call them thick leaves, but to the botanist they are flattened stems or segments. They vary from the size of the palm of one's hand to the size of a palm-leaf fan.

The prickly pear might be called the hedgehog of the vegetable world, so fearsomely is it armed. From the edges and faces of each segment protrude sharp thorns about the size of a common pin; and between these are tufts of tiny thorns, finer than the most delicate needle, and little longer than a grain of wheat. These smaller thorns are loosely attached to the segments, and come away at the slightest touch. It is not pleasant for one's leg to brush against a prickly pear; and it was to guard against these and the thorns of other plants of the semi-arid regions that the American cowboy put on his characteristic "chaps" or leather extra trousers.

Plant a Curiosity to Early Explorers

In our West and Southwest and in Mexico, prickly pears grow usually in stony ground in rather dry regions. In some sections they attain a considerable height, but for the most part they are scattered and have not proved exceedingly troublesome to stock growers and farmers. The plant was a curiosity to the Spanish explorers who followed Columbus to the New World. They promptly introduced it into Europe along with the much more desirable potato and tobacco. Soon patches of prickly pear were growing on the waste lands of Spain and in other Mediterranean countries. In Sicily the cacti are actually of economic value, for their figlike fruits supply food. The fruits are rarely eaten in the United States but are used to a certain extent in Mexico.

In Europe, as in America, prickly pears have been confined to waste lands and have not proved troublesome. In Australia, however, these American plants

the narrowing banks of the St. Mary's River, a sunken river mouth like all the Chesapeake Bay inlets. As the boat makes the final turn among the crescent beaches, green fields and blotches of dark pine, a pier comes into view at the foot of a high green bank. Among the trees is the white shaft of a monument to Leonard Calvert, who founded the Palatinate of Maryland on this site in 1634. For many years St. Mary's was the capital of Maryland and the bricks of the old State House are now incorporated in the vine-covered Episcopal Church set in the ancient graveyard.

The charge that America is cursed by the speed of modern life cannot be made to include the Chesapeake Bay country. Life here takes its pace from the soft, sunny climate, and the inhabitants at each landing watch the arrival and departure of their "argosy" to the outside world with abiding calmness of spirit. Since there are no hills, the tree-clotted headlands and islands and the jutting piers seem to be some peaceful and pastoral design embossed upon a limitless blue sheet of water.

A Chesapeake Bay voyager soon realizes that fine seamanship is not confined to the high seas. Taking a river steamer around curves and turning a 100-foot boat around in a space which appears to measure 98 feet, calls for careful navigation.

Bulletin No. 4, February 13, 1928.

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ST. MARY'S RIVER, WHERE THE MARYLAND COLONISTS LANDED

The high bluffs of a beautiful river, which he named St. Mary's, was the site chosen by Leonard Calvert for the first settlement in 1634.

found conditions exactly to their liking, and they have run riot over millions of acres of valuable land, choking it with a veritable jungle of fleshy segments and thorns, which the Australian settler has found it impossible to kill out. The region in which the prickly pear flourishes in Australia is the semi-tropical plains country of southern Queensland. A generation or so ago an agricultural experimenter brought in a single plant, carefully packed in cotton, and set it out on a Queensland down. From this single plant, the gray-green curse has to-day spread over more than 60 million acres of land.

Digging up the prickly pear is out of the question. Any segments left on the ground promptly take root and form new plants. It is a very practical case of Hydra's heads. A disease that will spread through the mass seems the only hope, and this weapon is believed now to have been found in the Bermuda malady which extends over a plant in hot weather, quickly destroying it by a sort of soft rot. One important fact remains to be investigated. Will the disease attack other and perhaps valuable plants? Australia has had too many tragic experiences with off-hand introductions—notably prickly pears and rabbits—to take any chances.

Bulletin No. 5, February 13, 1928.

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THE PRICKLY PEAR IS NOT AN UNWELCOME GUEST IN SARDINIA

In the summer time women and children gather the sweet fruit of the "Indian fig" with long bamboo poles. An Italian syndicate plans to erect a factory in southern Sardinia to make commercial alcohol from this fruit, which is rich in sugar.